

*REMARKS/ARGUMENTS**The Pending Claims*

Claims 1, 6, 8, and 15-24 are pending. Claims 1, 6, and 8 are currently being examined and are directed to a magnetic carrier for a biological substance, such as a nucleic acid. Claims 15-24 are currently withdrawn.

Amendments to the Specification and Claims

The specification has been amended to correct grammar and to replace the term “mixed oxide” with “composite oxide” to provide a better English translation of the corresponding Japanese phrase in the priority document Japanese Patent Application 267170/2002 (which is referenced in, and incorporated by reference into, the specification at page 72, lines 11-13).

Claims 1, 21, and 23 have been amended to recite that the particle is coated with a composite oxide of silicon and aluminum, as supported by the specification at, for example, page 31, lines 21-33.

No new matter has been added by way of these amendments.

Summary of the Office Action

Claims 1, 6, and 8 are rejected under 35 U.S.C. § 102(e), as allegedly anticipated by Tan et al. (U.S. Patent 6,548,264). Reconsideration of this rejection is hereby requested.

Discussion of the Anticipation Rejection

Claims 1, 6, and 8 allegedly are anticipated by Tan et al. Tan et al. allegedly discloses a magnetic carrier, which is a silica-coated ferromagnetic iron oxide particle with an average size of 1-1,000 nm (col. 4, lines 26-35). According to the Office Action, the particle disclosed by Tan et al. has a silica content that falls within the claimed range. See col. 12, lines 61-65, and col. 13, lines 1-5. The silica-coated particle allegedly can bind to a nucleic acid (col. 6, lines 36-42). The Office also maintains that since Tan et al. discloses the same magnetic particle as the pending claims, Tan et al.’s particle necessarily has the same aspect

ratio, saturation magnetization, and coercive force as the magnetic particle of the pending claims.

The pending claims have been amended to make it more clear that the ferromagnetic iron oxide particle of the claimed magnetic carrier for a biological substance is coated with a composite oxide of silicon and aluminum.

Tan et al. discloses that the particle core (12) can have a shell coating (14). The shell (14) can be “an inorganic oxide such as alumina or silica, or mixtures of the foregoing” (col. 5, lines 53-60). Applicants point out that none of these materials, namely alumina, silica, or a mixture thereof, is equivalent to “a composite oxide of silicon and aluminum,” as required by the amended pending claims. In particular, a composite oxide consisting of silicon and aluminum can be represented by a $\text{SiO}_2 - \text{Al}_2\text{O}_3$ composition, in which the silica and alumina share at least one bond. Thus, the silica and alumina in a composite oxide cannot be physically separated. A mere admixture of silica and alumina, as suggested by Tan et al. would not result in a $\text{SiO}_2 - \text{Al}_2\text{O}_3$ composition.

Thus, the magnetic particles of Tan et al. and the pending claims are structurally different. In view of these structural differences, the resulting nanoparticles of Tan et al. cannot be presumed to have the same functional properties as the magnetic carrier defined by the pending claims, especially to be capable of binding a nucleic acid (item (iii) of claims 1, 6, and 8 (and withdrawn claims 15-24)). For these reasons, Tan et al. does not anticipate the subject matter of claims 1, 6, and 8 (or withdrawn claims 15-24).

Moreover, the present invention, as defined by the pending claims, is not obvious in view of Tan et al. Tan et al. does not disclose or suggest the claimed composite oxide coating for magnetic particles. In addition, the disclosure of Tan et al. would have provided one of ordinary skill in the art with no reason to modify the coating of the magnetic particle as taught in Tan et al. in such a significant manner so as to arrive at the present invention. Indeed, Tan et al. does not recognize or appreciate any benefit to coating a magnetic particle with a composite oxide of silicon and aluminum, as required by the pending claims.

Applicants discovered that coating a magnetic particle with a composite oxide of silicon and aluminum improves the uniformity of adhesion to the surface of the particle (see,

e.g., page 31, lines 30-33, of the specification). Also, magnetic particles coated with a composite oxide of silicon and aluminum exhibit superior characteristics with respect to the isolation and purification of nucleic acids and surface smoothness and flowability (see, e.g., page 31, lines 4-9, of the specification). Examples 18-20 and Comparative Example 6 of the specification illustrate the benefits of a magnetic particle coated with a composite oxide of silicon and aluminum in accordance with the present invention. These properties were unexpected in view of the prior art and further evidence the unobviousness of the present invention as defined by the pending claims.


Under the circumstances, the magnetic carrier as defined by the pending claims is not obvious in view of Tan et al.

Since the present invention, as defined by claims 1, 6, and 8 (and withdrawn claims 15-24), is novel and unobvious in view of Tan et al., Applicants respectfully request the withdrawal of the rejection based on Tan et al.

Conclusion

Applicants respectfully submit that the patent application is in condition for allowance. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,



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